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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/500,425

09/07/2004

Achim Weber

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EXAMINER

YU, MELANIE J

ART UNIT

PAPER NUMBER

1641

MAIL DATE

DELIVERY MODE

11/05/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/500,425	Applicant(s) WEBER ET AL.	
	Examiner MELANIE YU	Art Unit 1641	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 August 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7, 11-65, 78, 80, 82, 84, 86, 88, 90 and 92-96 is/are pending in the application.
- 4a) Of the above claim(s) See Continuation Sheet is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 6, 7, 13-22, 24-26, 29-31, 35-46 and 90 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 June 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>8/18 and 9/24</u> . | 6) <input type="checkbox"/> Other: _____ |

Continuation of Disposition of Claims: Claims withdrawn from consideration are 5,11,12,23,27,28,32-34,47-65,78,80,82,84,86,88 and 92-96.

DETAILED ACTION

1. Applicant's amendment filed 18 August 2009 has been entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
 2. Ascertaining the differences between the prior art and the claims at issue.
 3. Resolving the level of ordinary skill in the pertinent art.
 4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
2. Claims 1-4, 6, 7, 13-17, 19-22, 24-26, 29-31, 35-46 and 90 are rejected under 35 U.S.C. 103(a) as being obvious over Mirkin et al. (US 2002/0127574) in view of Kotov (US 7,045,087) further in view of Lynn et al. (US 7,112,361).

Regarding claims 1 and 90, Mirkin et al. teach an element comprising a carrier with a surface (transparent substrate, Fig. 13B) and at least one microstructure on the carrier surface (single microstructure shown, Fig. 13B, bottom two figures), wherein the microstructure consists of individual components in the form of nanoparticles (circular elements are gold nanoparticles, Fig. 13B), which have molecule specific detection sites with one or more first functional groups (DNA absorbed onto particles, Fig. 13B) to

Art Unit: 1641

which biologically functioning or active molecules bind to the first functional groups can be bound in a directional manner and thus make possible the addressability of the microstructure (analyte DNA strand hybridized to first functional group, Fig. 13B), and wherein between the surface of the carrier and the microstructure at least one layer of a bonding agent that is a self assembled monolayer based on thiol is provided to ensure permanent adherence of the nanoparticles (nanoparticles bonded to the surface through thiol monolayer, Fig. 13B).

Mirkin fails to teach the bonding agent being a plasma layer with charged chemically reactive groups.

Kotov teaches a functional element comprising: a carrier with a surface (col. 5, lines 18-27) and at least one microstructure on the carrier surface, where the microstructure consists of individual components in the form of nanoparticles (second solution deposits nanoparticles on the substrate, col. 5, lines 42-48) and a bonding agent between the surface of the carrier and the nanoparticles, wherein the bonding agent is a polyelectrolyte layer with charged groups (first solution deposits positively charged polyelectrolyte layer on the substrate, which is a polyelectrolyte layer, and is between the substrate and the nanoparticles, col. 5, lines 32-41; polyelectrolyte layer has chemically charged reactive groups, col. 3, lines 49-59), and is provided to ensure permanent adherence of the nanoparticles (nanoparticles are adsorbed onto the surface and are therefore permanently adhered, col. 3, lines 31-41; film of plasma and nanoparticles remains intact as a unitary structure, col. 2, lines 13-15), in order to provide a freestanding film that permits incorporation of biological compounds.

Lynn et al. teach that a polyelectrolyte layer attached to a substrate through a plasma layer, wherein the polyelectrolyte layer has charged groups, thereby creating a plasma layer with charged groups, wherein the two layers, the plasma layer and the polyelectrolyte layer form a single bonding layer as recited by the claims, wherein the plasma layer is the plasma and the polyelectrolyte are the charged groups (col. 2, line 58-col. 3, line 15 and col. 8, lines 5-25), in order to provide a substrate having polyelectrolyte layers with alternating charge.

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to include in the element of Mirkin et al., a bonding agent of a polyelectrolyte layer with charged chemically reactive groups between the microstructure and the carrier surface as taught by Kotov, in order to take advantage of overcompensation of surface charges and provide increased adsorption of nanoparticles on the substrate. It would have further been obvious to one having ordinary skill in the art at the time the invention was made to attach the polyelectrolyte to the substrate of Mirkin et al. in view of Kotov, using a plasma layer as taught by Lynn et al, in order to provide a uniform surface layer for layer-by-layer assembly of polyelectrolytes.

Although Lynn et al. does not specifically recite a "bonding layer" when combined with Kotov, the combination of references teaches the components required of a bonding layer as recited by the instant claims. The plasma taught by Lynn et al. is the plasma component of the bonding layer and the polyelectrolyte taught by Lynn et al. and Kotov is the charged groups of the bonding layer. Therefore the combination of

Art Unit: 1641

references teaches a bonding layer as recited by the instant claims having plasma directly on the substrate and a polyelectrolyte attached to the plasma therefore giving the plasma charged groups. When combined with Kotov the nanoparticles are then attached to the charged groups (polyelectrolyte) portion of the binding layer.

Regarding claims 2-4, Mirkin et al. teach the microstructure having a diameter of $375\text{ }\mu\text{m}$ on the planar, glass slides (surface is a glass slide, which is planar, par. 133; diameter of spot a length parameter and is within the recited range of 10 nm to $999\text{ }\mu\text{m}$, par. 383).

With respect to claim 6, Mirkin et al. teach the surface of the carrier having a layer of a chemical compound that prevents nonspecific attachment of biological molecules to the carrier surface (par. 372).

Regarding claim 7, Mirkin et al. teach a layer of a bonding agent arranged between the carrier surface and the microstructure (nanoparticles bonded to the surface through thiol monolayer, Fig. 13B).

With respect to claims 13-15, Mirkin et al. teach the nanoparticles comprise a core and a surface that has the molecule specific recognition sites covalently bound to the nanoparticles (oligonucleotides with a functional group that binds to the nanoparticles is bound to the nanoparticles, par. 61) and biologically active molecules bound to the molecule-specific recognition sites (oligonucleotides that are recognition oligonucleotides are attached to the biologically active molecules on the nanoparticles, par. 62).

Regarding claims 16 and 17, Mirkin et al. teach that the molecules are bound while preserving their biological activity (par. 7 and 62) and the bound molecules are nucleic acids (par. 7).

With respect to claims 19 and 20, Mirkin et al. teach the molecule specific recognition sites comprising one or more first functional groups and the bound molecules comprise complementary second functional groups that bind the first functional groups (par. 173) and the function group being an amino or aldehyde (par. 180).

Regarding claims 21 and 41-46 are drawn to methods of making the functional element and does not provide additional structural limitations. Mirkin et al. teach the limitations recited in claim 1 and therefore has the same structure as a functional element produced by the methods recited in claims 21 and 41-46.

With respect to claims 22, 24-26 and 29, Mirkin et al. teach the first functional groups bound to the surface of the nanoparticles via a spacer (par. 242) and the core of the nanoparticles being polystyrene (par. 180) and having a diameter of 5-150 nm (par. 107), which falls within the recited range of 5 to 500 nm.

Regarding claims 30, 31 and 35, Mirkin et al. teach the core or the bound molecule having an anchored fluorescence marker (oligonucleotide or nanoparticles labeled with fluorescent marker, par. 178).

With respect to claims 36-38, Mirkin et al. teach further molecules bound to the bound molecules (par. 323) and the microstructure consisting of a single (par. 104) or several nanoparticles layers (par. 83).

Regarding claims 39 and 40, Mirkin et al. teach that within several microstructures, the nanoparticles making up the microstructures have different molecule specific recognition sites that are arranged on the carrier surface and various molecules are bound to the microstructures (different nucleic acids, par. 173).

3. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mirkin et al. (US 2002/0127574) in view of Kotov (US 7,045,087) further in view of Lynn et al. (US 7,112,361) and further in view of Mirkin et al. (US 2002/0132371).

Mirkin et al. ('574) in view of Kotov further in view of Lynn et al. teach the biologically active molecules are nucleic acids, but fail to teach them being antibodies.

Mirkin et al. ('371) teach that nucleic acids, antibodies and other specific protein binding proteins (col. 175) may be used in a similar device to provide for detection or protein analytes.

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to include in the function element of Mirkin et al. ('574) in view of Kotov further in view of Lynn et al., proteins instead of nucleic acids as taught by Mirkin et al. ('371), depending on whether detection of a protein analyte is detected.

Response to Arguments

4. Applicant's arguments with respect to the rejections under 35 USC 103(a) have been considered and are persuasive. The previous rejections of the claims have been withdrawn. However, applicant's arguments are moot in view of the new ground(s) of rejection. Upon further consideration, a new ground(s) of rejection is made in view of Lynn et al. teaching a plasma layer on a substrate attached to a polyelectrolyte, which

Art Unit: 1641

would create a bonding layer being a plasma layer with charged groups as required by the instant claims. When combined with Mirkin et al. and Kotov, the substrate of Kotov would have a plasma layer between the polyelectrolyte having charged groups and the substrate, which is considered a plasma layer having charged groups. The plasma layer is the charged plasma layer taught by Lynn et al. and the polyelectrolyte is the charged groups and is attached to the plasma layer thereby forming one "plasma" layer.

Conclusion

No claims are allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MELANIE YU whose telephone number is (571)272-2933. The examiner can normally be reached on M-F 8:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Shibuya can be reached on (571) 272-0806. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1641

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Melanie Yu/
Primary Examiner, Art Unit 1641